



# Enhancing the STEM Curriculum with Conservation Science: a Case Study of the Italian Renaissance and Frescos

## Day 1 Building Materials (I): Chemistry: Energy

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## Overview.

The Middle (or Dark) Ages stretched from the end of the Roman Empire 476 AD to the late 1300s. The Italian Renaissance (or “rebirth”) which spanned from 1400 – 1700 AD, marked the beginning of a new, modern way of thinking about the world. (Giorgio Vasari). Many consider Firenze (or Florence) the birthplace and most important city in the Italian Renaissance.



## Overview.

The famous thinkers (Michelangelo, Leonardo, Galileo, and Vasari) and thinking that characterized the Renaissance period represent one of the most unique combinations of the arts, social sciences, natural sciences, and technology.



**Vasari**  
Painter  
Architect  
Engineer  
Writer  
Historian

**Leonardo**  
Engineer  
Scientist  
Theorist  
Sculptor  
Architect  
Painter

**Galileo**  
Astronomer  
Physicist  
Engineer

**Michelangelo**  
Sculptor  
Painter  
Architect  
Poet



## ***Mural painting and the Italian Renaissance.***

The main Cathedral of Firenze is **the Cattedrale di Santa Maria del Fiore**.

One the most remarkable structures of the Renaissance, completed in 1436, it features the largest masonry dome standing today.



- Four million bricks
- Weighs more than 25,000 tons

### **Great Thinker**

Filippo Brunelleschi

Born in 1377 from Florence, Italy

Architecture

Sculpture

Mechanical engineering

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“The Last Judgement”

45.5 meters in diameter  
116 meters in height

Giorgio Vasari



## ***Mural painting and the Italian Renaissance.***

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You can still buy the pigments used to paint the interior of the dome in the city of Firenze – just a few blocks away from the Dome.





## Six-Day Lesson Plan.

We will study the materials, design process, environmental degradation, and conservation of Italian Renaissance fresco paintings to connect the concepts of chemistry, engineering, and understanding conservation of our own cultural heritage in the next two weeks.

### Day 1.

Today, you will define a fresco and explore the fresco making process through the chemical composition of the building material. Experientially, you will prepare arriccio.

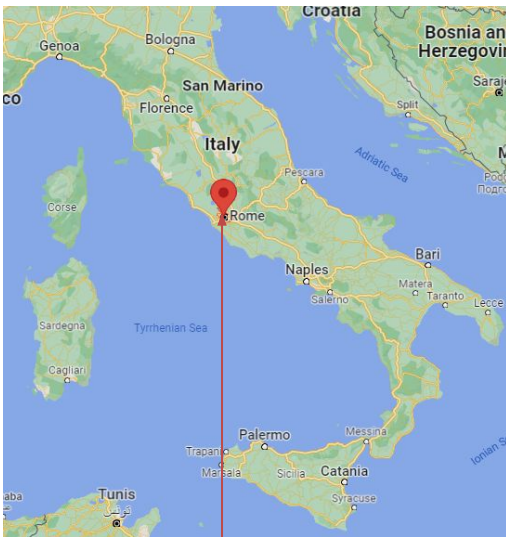
Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Building Materials (I)	Sinopia	Building Materials (II)	Fresco Painting	Fresco Degradation	Fresco Conservation
Chemistry: Energy	Design	Chemistry: Reactions	Chemistry: Solutions and Dispersions	Environmental Chemistry	Nanochemistry
Great Thinkers: Brunelleschi	Great Thinkers: Leonardo	Great Thinkers: Vasari	Great Thinkers: Michaelangelo	Great Thinkers: Ferroni	Great Thinkers: Baglioni



## What is a fresco?

Fresco is a painting technique in which a dispersion of aqueous pigments are applied to a thin layer of fresh, lime plaster.

Over time, the plaster reacts with atmospheric carbon dioxide to form calcium carbonate, fixing the pigment in a thin crystalline surface phase, the lime crust.



Rome



Sistine Chapel, Rome



"Creation of Adam", Michelangelo